

Other embodiments not described herein are also within the scope of the following claims.

What is claimed is:

5

100 99 98 97 96 95 94 93 92 91 90 89 88 87 86 85 84 83 82 81 80 79 78 77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

1. A waveguide comprising:

a waveguide core having a top surface that defines an angle.

5 2. The waveguide of claim 1, wherein the angle is at least equal to an angle of total internal reflection of the waveguide core.

10 3. The waveguide of claim 1, wherein the waveguide core defines a beveled mirror.

15 4. The waveguide of claim 1, further comprising: a phototransistor having a base, wherein the waveguide core is coupled to the base of the phototransistor.

5. The waveguide of claim 4, wherein the waveguide core defines a beveled mirror.

20 6. The waveguide of claim 5, wherein the waveguide core is disposed over a substrate and the beveled mirror directs a mode propagated through the waveguide core into the substrate.

7. The waveguide of claim 1, further comprising:  
a photodiode having an n-type region, an intrinsic  
layer region, and a p-type region,  
wherein the waveguide core is coupled to the intrinsic  
5 layer region of the photodiode.

8. The waveguide of claim 7, wherein the waveguide  
core defines a beveled mirror.

10 9. The waveguide of claim 8, wherein the waveguide  
core is disposed over a substrate and the beveled mirror  
directs a mode propagated through the waveguide core into  
the substrate.

15 10. A waveguide comprising:  
a waveguide core disposed over a substrate; and  
a cladding layer disposed between the waveguide core  
and the substrate,  
wherein the waveguide core is offset from the  
20 substrate by the cladding layer.

11. The waveguide of claim 10, wherein the waveguide  
core has an index of refraction that is higher than an  
index of refraction of the cladding layer.

12. The waveguide of claim 10, further comprising:  
a detector material disposed over the substrate,  
wherein at least a portion of the detector material is  
removed proximate the waveguide core.

5

13. A phototransistor comprising:  
an emitter formed in a substrate;  
a collector formed in the substrate; and  
a base formed in the substrate between the emitter and  
10 the collector,  
wherein the emitter, the collector, and the base are  
in lateral alignment in the substrate.

14. The phototransistor of claim 13, wherein the base  
15 comprises a lossy material.

15. The phototransistor of claim 13, further  
comprising:  
a waveguide core.

20

16. The phototransistor of claim 15, wherein the  
waveguide core is configured to propagate a mode into the  
base.

17. A photodiode comprising:

an n-type region formed in a substrate;

a p-type region formed in the substrate; and

an intrinsic portion of the substrate disposed between

5 the n-type region and the p-type region,

wherein the n-type region, the p-type region, and the  
intrinsic portion of the substrate are in lateral  
alignment.

10 18. The photodiode of claim 17, wherein the intrinsic  
portion of the substrate comprises a lossy material.

15 19. The photodiode of claim 17, further comprising:  
a waveguide core.

20. The photodiode of claim 19, wherein the waveguide  
core is configured to propagate a mode into the intrinsic  
portion of the substrate disposed between the n-type region  
and the p-type region.

21. A waveguide comprising:  
a waveguide core disposed over a substrate;  
an attenuating layer disposed over the substrate and  
below the waveguide core; and

a detector layer disposed between the attenuating layer and the substrate.

22. The waveguide of claim 21, wherein the  
5 attenuating layer comprises germanium.

23. The waveguide of claim 21, wherein the detector layer comprises silicon.

10 24. A method for fabricating a device comprising:  
forming a cladding layer over a substrate having a  
detector layer disposed over a portion of the substrate;

forming an opening in the cladding layer to expose a  
portion of the detector layer;

15 forming a waveguide layer over the cladding layer and  
the opening;

removing a portion of the waveguide layer to define a  
waveguide core; and

20 implanting a first region and a second region into the  
exposed portion of the detector layer proximate the  
waveguide core.

25. The method of claim 24, wherein implanting a first region and a second region comprises implanting an emitter and a collector.

5 26. The method of claim 24, wherein implanting a first region and second region comprises implanting an n-type region and a p-type region.

10 27. The method of claim 24, wherein forming the waveguide layer includes offsetting the waveguide layer from the detector layer by the cladding layer.

15 28. The method of claim 24, wherein forming a waveguide layer over the cladding material includes forming a beveled mirror.

20 29. The method of claim 25, wherein forming the waveguide layer includes offsetting the waveguide layer from the detector layer by the cladding layer.

30. The method of claim 25, wherein forming a waveguide layer over the cladding material includes forming a beveled mirror.